

**Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, D.C. 20554**

*In the Matter of  
Protecting and Promoting the Open Internet*

*Applications for Review of CTIA and Competitive  
Carriers Association*

GN Docket No. 14-28

**COMMENTS OF ROOTMETRICS**

On June 20, 2016, CTIA and the Competitive Carriers Association filed Applications for Review of the Public Notice regarding the Open Internet transparency rule that was issued by the Chief Technologist, Office of the General Counsel, and Enforcement Bureaus (the “Bureaus”) on May 19, 2016 (the “Public Notice”).<sup>1</sup> Among other things, the Public Notice establishes that mobile broadband providers that disclose their results from the Measuring Broadband America program (“MBA”) will have made a “sufficient” disclosure under the Open Internet rules—a new safe harbor from regulatory scrutiny.<sup>2</sup>

As described in the Applications for Review, the Public Notice was adopted without any kind of public input. Had the Bureaus sought public comment, they would have learned that the crowd-sourced data collected by the MBA program contains methodological, technical, and statistical flaws that make it inconsistent with the purposes of the *2015 Open Internet Order*.

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<sup>1</sup> Guidance on Open Internet Transparency Rule Requirements, GN Docket No. 14-28, Public Notice, DA 16-569 (rel. May 19, 2016) (“Public Notice”); Application for Review of CTIA, GN Docket No. 14-28 (filed June 20, 2016) (“CTIA Application for Review”); Application for Review of Competitive Carriers Association, GN Docket No. 14-28 (filed June 20, 2016) (“CCA Application for Review”).

<sup>2</sup> Public Notice at 6-7.

As an independent mobile analytics firm offering scientific insights into how users experience networks under real-world conditions, RootMetrics is exceptionally positioned to assist the Commission in understanding the limitations of crowd-sourced data. RootMetrics can also demonstrate the benefits of adopting a more rigorous, scientific approach to measuring broadband performance that would provide the clarity and accuracy of performance comparisons required to meet the Commission’s goals. For the reasons described below, the Applications for Review should be granted so that the full Commission can develop the record needed to ensure that any safe harbor the FCC adopts accurately reflects the real-world characteristics of consumer mobile broadband services.

**I. MEASURING BROADBAND AMERICA DATA DOES NOT ACCURATELY REFLECT MOBILE PROVIDERS’ ACTUAL PERFORMANCE.**

The FCC’s Open Internet rules require broadband providers to publicly disclose “accurate information” about their performance metrics, including “actual download and upload speeds, actual latency, and actual packet loss.”<sup>3</sup> As the FCC has emphasized, reliable information about broadband performance allows consumers to make an informed decision among available broadband providers.<sup>4</sup> In the Public Notice, the Bureaus established that mobile broadband providers that report their networks’ results as gathered by the MBA program would be deemed compliant. The Commission should revisit that decision because the MBA program, which relies on volunteers using the Speed Test app, does not produce the “accurate information” that the *2015 Open Internet Order* requires.<sup>5</sup>

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<sup>3</sup> *Id.* at 2, 6.

<sup>4</sup> *Protecting and Promoting the Open Internet*, Report and Order on Remand, 30 FCC Rcd. 5601, 5673-75, ¶ 166 (2015) (“2015 Open Internet Order”).

<sup>5</sup> *Id.* ¶ 165.

Multiple aspects of the MBA program's reliance on unreliable methodologies and data sources undermine the validity and reliability of the program's results. First, the MBA program relies on volunteers using the FCC Speed Test app, which can be downloaded from Google Play and the Apple Store.<sup>6</sup> The app measures download speed, upload speed, latency, and packet loss. Users can configure the app to limit the amount of data that testing consumes and to only perform testing when the user actively initiates it. It does not automatically gather data on a schedule or in pre-determined circumstances or environments designed to produce scientifically valid results.<sup>7</sup>

Second, these "crowd users" are a self-selected panel that is not and is not intended to be representative of the general population of wireless consumers. Participation requires potential testers to have heard of the program. Users must also meet the program's requirements. To participate, a user must have an Android phone running Android 2.2 or later, or an iPhone running iOS 7 or later. Blackberry and Windows users cannot participate. Finally, users must take the initiative to download the app, configure it, and run the tests. That is a tall order for many customers who do not see a direct benefit from using the app. The group that makes it through these hurdles will certainly represent a population that is substantially different from the general population in ways that bias the program's results.

Third, a self-selected sample also creates bias based on how users select carriers. Consumers generally do not select carriers that lack coverage where they typically use

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<sup>6</sup> See *Measuring Broadband America Mobile Broadband Services*, FED. COMM'NS COMM'N, <https://www.fcc.gov/general/measuring-mobile-broadband-performance#block-menu-block-4> (last visited June 22, 2016) ("FCC MBA Description"); see also *Mobile Broadband*, MEASURING BROADBAND AMERICA, <https://www.measuringbroadbandamerica.com/mobile-broadband/> (last visited June 22, 2016).

<sup>7</sup> See FCC MBA Description.

their devices. For that reason, the MBA crowd data reflects self-filtered carrier users, not randomly selected users in a particular place as is required to produce reliable results. This approach will naturally bias MBA crowd speed tests against carriers who provide more challenging rural coverage (with typically lower speeds).

Fourth, the MBA program tests circumstances that are not representative of the overall U.S. wireless environment. In many cases, users themselves select when and where to perform tests. Because of limitations in the iOS platform, iPhones cannot perform speed tests while users are using their device for other purposes. iPhone users must manually initiate tests in order to gather data—the app does not work “in the background”. Android users may run tests in the background while not actively using the app, but that feature can be turned off. When users decide when to perform tests, they often test under unusual circumstances, such as when they are experiencing a temporary data network problem or in order to diagnose a problem location, such as a basement—a problem RootMetrics has observed in its own experience with crowd-sourcing. These kinds of on-demand tests may provide real utility for individuals seeking to understand specific connectivity challenges, but they do not provide a representative picture of a provider’s overall performance.

Fifth, crowd-sourced data is susceptible to tampering. It is possible to take steps that improve performance as measured by MBA without actually improving service. For example, network design can influence results. If networks are optimized to testing servers, it may produce stronger performance than most customers actually experience. Users also can be incentivized to influence results. If, for example, certain testing apps are marketed to a certain kind of users or testing by a certain kind of customer (by, for example, excluding testing from data caps), the pool of testers could be artificially filled with users likely to achieve good results.

Professional testers can also influence results. Certain crowd-sourced data has been found to include pre-release devices or devices operating in lab environments. This data does not reflect real-world user experience.

Had the Bureaus sought public comment before establishing the safe harbor, they would have learned more about these limitations. Instead, the Public Notice fails entirely to grapple with these limitations. Indeed, there is no evidence that the FCC has made any attempt to adjust the MBA program to correct for these data quality problems.

## **II. THE PUBLIC NOTICE’S REQUIREMENT THAT CARRIERS MEASURE AT THE CELLULAR MARKET AREA WILL PRODUCE MISLEADING RESULTS.**

As described in the Applications for Review, the Public Notice requires mobile broadband providers to disclose actual performance metrics for every Cellular Market Area (CMA) where service is offered.<sup>8</sup> The Bureaus’ new safe harbor can be used anywhere the MBA program has gathered a “sufficient CMA sample size.”<sup>9</sup> That decision, made without the benefit of public input, will skew the data that mobile providers produce because users within large and heterogeneous CMAs will have, and report, a wide variety of experiences. Producing an average of these results will not accurately reflect user experience.

The Los Angeles CMA illustrates this problem. This CMA covers four California counties: Los Angeles County, Orange County, San Bernardino County, and Riverside County.<sup>10</sup> As depicted on the map below, this CMA is so large that it covers an area from the Pacific Ocean to the Nevada and Arizona borders. It includes large areas of desert and national

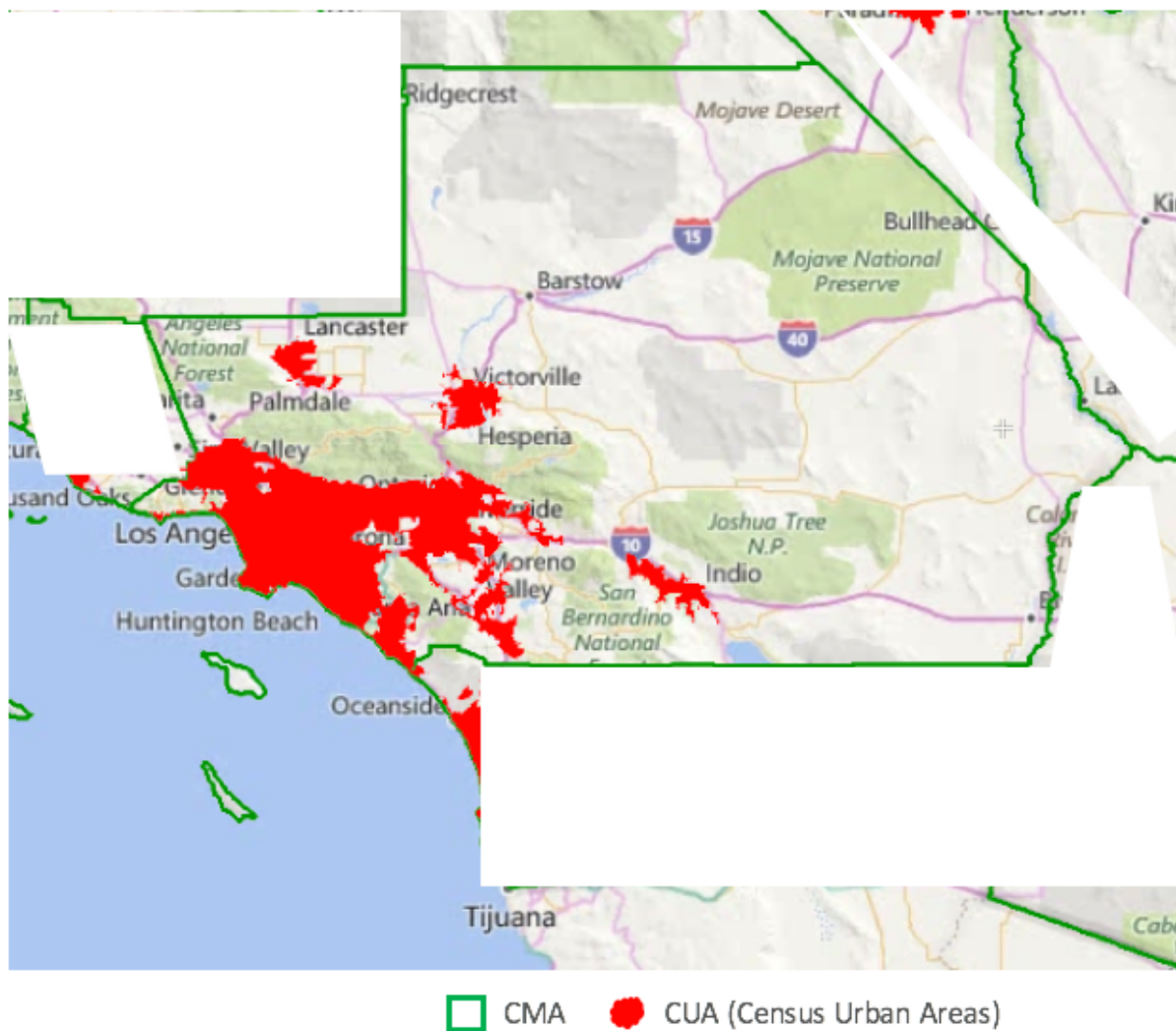
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<sup>8</sup> See CTIA Application for Review at 10.

<sup>9</sup> Public Notice at 6.

<sup>10</sup> FED. COMM’NS COMM’N, “CMAs and Counties,” Cellular License Report (2003), [http://wireless.fcc.gov/services/cellular/data/CL\\_Report.xls](http://wireless.fcc.gov/services/cellular/data/CL_Report.xls).

forest. But it also includes five of the largest 125 Census Urban Areas by population in the United States, each one of which is separately tested and reported by RootMetrics. The majority of users in the CMA are concentrated in urban Los Angeles, where congestion is more likely to impact user experience than coverage. But because the CMA also includes hundreds of thousands of acres of the Angeles National Forest and Joshua Tree National Park, other users will face significant coverage challenges. Simply averaging the experiences of consumers in these very different environments will undermine the reliability of results for both rural and urban areas.



*Figure 1: Map of Los Angeles Cellular Market Area Compared with Census Urban Area*

Even analyzing the variability of performance in major urban areas in this CMA reveals that measuring CMA widely is an error. In RootMetrics' most recent testing, one major carrier's median downlink speed was 25.1 Mbps in Mission Viejo (where it was one of the fastest among the four national carriers), 16 Mbps in Indio, 11.1 Mbps in Los Angeles, and 9 Mbps in Riverside (where it was the slowest of the four national carriers). Aggregating data across this entire CMA would naturally lead to a very misleading and atypical consumer performance result given the wide range of speeds on just one carrier across these large urban areas.

That problem is compounded by the inclusion of hard-to-serve areas like the remote parts of national forests, where CMA-level crowd-sourced data will improperly penalize providers that offer some service over those who provide no service at all. Users who have selected a provider without coverage outside major metropolitan areas often know the limitations of their carrier and are unlikely to search for a signal—or manually conduct a speed test—where they know that there is no service. Carriers that do attempt to provide some coverage in remote areas do so with well understood trade-offs: there may be a signal, but throughput is likely to be more limited. If crowd-sourced data is reported at the CMA level, average findings that include results from places like Joshua Tree National Park will underrepresent the results most users are experiencing.

### **III. THE FCC'S DISCUSSION AND APPLICATION OF CROWD-SOURCED DATA IS INCONSISTENT AND REFLECTS QUESTIONABLE DATA AGGREGATION AND STATISTICAL METHODS.**

In selecting the MBA as a safe harbor, the Bureaus do not appear to have meaningfully considered the need for appropriate statistical methods in interpreting the data collected by the selected testing program.

For example, is not clear whether MBA will report on mean or median metrics. In its annual Mobile Wireless Competition Report, the FCC reports both mean and median results from crowd-sourced data. The extreme differences between the reported mean and median (for example, in the Eighteenth Report at Table VI.C.3. for the FCC Speed Test App, the mean LTE download speed in Mbps for Verizon is 16.63, while the median is 11.66) reveal the critical skew in the reported crowd-sourced data sets.<sup>11</sup> Far from “typical expected speeds,” this type of skew reveals both an unusual group of super-fast speeds pulling up the average and, presumably, a grouping of improperly counted “0” speeds pulling down the median. RootMetrics reports only the median speed as it represents the most likely typical performance (and failed tests are not counted as “0” speed, but are instead considered in reliability measurements). Reporting on either the mean or the median given the obvious skew and data aggregation challenges will not reliably represent typical consumer performance.

The FCC’s discussion of broadband performance testing includes other similar problems. For example, speed and performance data are only valid if a network can be accessed where and when testing occurs. If a network speed test fails, that event reflects a reliability problem, but is not a proper speed measurement.<sup>12</sup> But the FCC apparently does count a failed speed test as a 0 speed in the reported speed test data it has received from SamKnows, the company operating the MBA program, creating less reliable results and inconsistencies in FCC reporting.<sup>13</sup> Had the

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<sup>11</sup> See *Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993; Annual Report and Analysis of Competitive Market Conditions With Respect to mobile Wireless, Including Commercial Mobile Services*, Eighteenth Report, 30 FCC Rcd. 14,515, 14,598 (2015) (“Eighteenth Report”).

<sup>12</sup> *Id.* ¶ 126 (“It is also important to note that for all mobile technologies, speed and performance measurements are only valid when a wireless connection can be accessed.”).

<sup>13</sup> See *id.* at n. 379.



Commission sought comment on its decision to adopt the MBA program as its safe harbor, it would have identified and had an opportunity to address these and other problems.

#### **IV. CROWD-SOURCED DATA IS MORE PROBLEMATIC IN THE MOBILE CONTEXT THAN IT IS FOR FIXED BROADBAND.**

The MBA programs performance in monitoring fixed broadband networks should not color the Commission’s view of the *mobile* MBA program. Important differences between fixed and mobile networks make the two programs poor comparators.<sup>14</sup> Most importantly, mobile networks are much more complex and subject to much greater variability depending on location and conditions. As described above, mobile networks in a single CMA may cover a wide range of geographies and topologies. That variability will inevitably impact testing conditions.

The Commission can address these measurement challenges in order to achieve accurate study results—but not with crowd-sourced data. RootMetrics understands this because it has analyzed and attempted to use both crowd-sourced data and scientific methodologies to measure mobile networks. In RootMetrics’ experience, mobile devices can be very inconsistent testing devices, and without careful controls, mobile devices will produce unreliable results. For that reason, RootMetrics selects a single consumer device from each carrier, benchmarked in advance to show each network in its best light, and then has a continuous quality program in place to ensure that performance reflects consumer experience of the network, not the device. RootMetrics also tests all networks at precisely the same time of day and location (i.e.,

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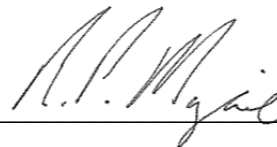
<sup>14</sup> The FCC acknowledged as much. *See id.* at n. 367 (“By contrast [to crowd-sourced mobile speed data], crowdsourced fixed broadband speed data, such as those collected by the Commission through SamKnows, can be gathered with more control. The SamKnows whiteboxes are able to measure actual fixed network speed and are not dependent on the vintage of the client hardware or software. In addition, the testers are chosen according to a valid sampling technique.”).

indoor, outdoor, driving, or walking). When testing mobile networks, more data is simply not always better data. If the pursuit of larger collections through crowd participation corrupts datasets with inconsistencies, gaming, and non-representative measurements, analysts end up with more numbers but less knowledge. We know this because we tried it.

## V. CONCLUSION

The Commission should not have adopted the MBA safe harbor without seeking public comment. These comments would have shown that crowd-sourced data can play a role in identifying the presence or absence of network types and coverage. But it would have also shown that such data is insufficiently reliable to make the kind of consumer mobile performance assessments required by the *2015 Open Internet Order*. The Commission should therefore grant the Applications for Review so that the Commission can develop a proper record on this topic, leading to a decision on how to proceed that will produce the public disclosures of “accurate information” that consumers deserve.

Respectfully submitted,

A handwritten signature in cursive script, appearing to read "A.P. Margie", is written above a horizontal line.

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